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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/703,527	11/01/2000	Matthew R. Arnold	13734(YOR920000357USI	1908

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EXAMINER
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TANG, KUO LIANG J

ART UNIT	PAPER NUMBER
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2122

DATE MAILED: 04/05/2004

5

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/703,527

Applicant(s)

ARNOLD ET AL.

Examiner

Kuo-Liang J Tang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. This Office Action is in response to the amendment filed on 01/27/2004.

Claims 1-36 are pending, effective date is 11/01/2000..

Claims 1, 6-8, 12, 25 and 30 are rejected under 35 U.S.C. § 102(b)

Claims 2, 3-5, 9-11, 13, 15-19 and 21-22, 24, 26-29, 31-33 and 35-36 are rejected under 35 U.S.C. § 103(a).

Claims 14 and 23 are rejected under 35 U.S.C. § 103(a).

Claims 20 and 34 are rejected under 35 U.S.C. § 103(a).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 6-8, 12, 25 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Burrows US Patent No. 5,710,724.

As Per Claim 1, Burrows teaches that in a computer system, an instrumented program associated with a first paging table is stored in a memory. The memory also stores an instrumented version of the uninstrumented program associated with a second paging table. The instructions of the uninstrumented and instrumented programs are stored at identical relative addresses. (E.g. see Abstract and associated). In that Burrows discloses the method that covering the steps of:

“a) Inserting yield points at distinguished locations of a program to be executed (E.g. see col. 4:21-27), each said yield point indicating a potential sampling operation during execution of said program;” (E.g. see FIG. 2 instruction points 210 and associated text).

“b) during program execution, identifying a yield point instance (E.g. see col. 3:44-46) and, in response to an identified yield point instance, ascertaining a state of said execution environment for indicating whether a sampling operation is to be performed;” (E.g. see col. 5:12-20, which states “...different types of performance monitoring can be done by mapping to an appropriate instrumented version. ...”), and,

“c) when state of said execution environment indicates a sampling operation, recording relevant information (E.g. see col. 4:21-27, gathering performance data) for characterizing behavior of said execution environment.”.

As Per Claim 6, the rejection of claim 1 is incorporated and further Burrows discloses:

“said state of said execution environment does not indicate a sampling operation, the step of executing a next instruction in said executing program after said identified yield point.” (E.g. see FIG. 3 uninstrumented program 121 and associated text).

As Per Claim 7, the rejection of claim 1 is incorporated and further Burrows discloses:

“ascertaining a state of said execution environment includes checking status of a trigger bit (E.g. see col. 4:45-53, paging values set and FIG. 3 mapper 300 and associated text) set by said execution environment to indicate performance of said sampling operation.”.

As Per Claim 8, the rejection of claim 1 is incorporated and further Burrows discloses:

“said trigger bit status is set periodically by said executing environment.” (E.g. see col. 4:45-53, paging values set and associated text).

As Per Claim 12, the rejection of claim 1 is incorporated and further Burrows discloses

“implementing a compiler device (E.g. see col. 5:30, compiler) for inserting one or more yield points (E.g. see col. 5:27-33, procedures 510) in said program.”.

As Per Claim 25, Burrows discloses:

“a) means for inserting yield points at distinguished locations (E.g. see col. 4:21-27) of a program to be executed, each said yield point indicating a potential sampling operation during execution of said program,” (E.g. see FIG. 2 instruction points 210 and associated text);

“b) mechanism for identifying instances of yield points inserted in said executing program,” (E.g. see col. 3:44-46).

“c) control device (E.g. see FIG.3 Mapper 300, table 125-126 and associated text) for determining a condition for performing a sampling operation of said executing program at an identified yield point instance,” (E.g. see col. 5:12-20, which states “...different types of performance monitoring can be done by mapping to an appropriate instrumented version. ...”), and

“d) sampling device for performing said sampling operation of said executing program upon satisfaction of said condition, and recording relevant information for characterizing

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behavior of said execution environment in response to said sampling.” (E.g. see col. 4:21-27, gathering performance data).

As Per Claim 30, the rejection of claim 25 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 8.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2, 3-5, 9-11, 13, 15-19 and 21-22, 24, 26-29, 31-33 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burrows in view of Blandy, US Patent No. 6,249,912.

As Per Claim 2, the rejection of claim 1 is incorporated and further Burrows does not explicitly disclose identifying a method currently executing in said program, said method including tracking frequencies of methods executed in said program for characterizing said program behavior. However, Blandy, in analogous art, teaches “identifying a method (E.g. see col. 3:1-2) currently executing in said program, said method including tracking frequencies of methods executed (E.g. see FIG.3 count field 304 and associated text) in said program for

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characterizing said program behavior”. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Blandy into the system of Burrows, to track the frequency of methods executed. The modification would have been obvious because one of ordinary skill in the art would have been motivated to determine the most recently used methods from a plurality of methods in a data processing system.

As Per Claim 3, the rejection of claim 2 is incorporated and further

“sampling operation includes identifying a calling context associated with methods called by said program, said method including tracking calling context frequency (E.g. see FIG.3 count field 304 and associated text) for characterizing said program behavior.” (see as noted above in Claim 2).

As Per Claim 4, the rejection of claim 1 is incorporated and further

“sampling operation includes identifying current program variable values, said program variable values (E.g. see FIG.3 count field 304 and associated text) being tracked for characterizing said program behavior.” (see as noted above in Claim 2).

As Per Claim 5, the rejection of claim 1 is incorporated and further

“sampling operation includes identifying basic blocks (E.g. see col. 3:1-2, the Examiner interpret basic block as method) executed in said program, said method including tracking a frequency of basic blocks (E.g. see FIG.3 count field 304 and associated text) for characterizing said program behavior.” (see as noted above in Claim 2).

As Per Claim 9, the rejection of claim 8 is incorporated and further Burrows does not explicitly disclose a runtime system interrupt an interrupt handler to set trigger bit. However Blandy, in analogous art, teaches “invoking a runtime system interrupt (E.g. see col. 3:53-54) at periodic time intervals;” and “implementing an interrupt handler mechanism for catching said interrupt and setting said trigger bit.(E.g. see col. 3:46 to col. 4:6)”. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Blandy into the system of Burrows, to implement system interrupt to set trigger bit. The modification would have been obvious because one of ordinary skill in the art would have been motivated to employ a timer based sampling process to track executing methods and eliminates the need for global counter reset (sweep) by simulating a sweep in each method that is detected when sampling occurs. (E.g. see col. 3:47-50).

As Per Claim 10, the rejection of claim 2 is incorporated and further Burrows discloses: “identifying a currently executing method comprises determining an instruction address (E.g. see FIG. 2&3 instrumentation points 210) at which the yield point was taken and mapping that address to a called method (E.g. see FIG. 2&3 instrumentation routines 220)”.

As Per Claim 11, the rejection of claim 3 is incorporated and further Burrows discloses “inspecting a call-stack runtime data structure (E.g. see FIG. 3 paging table 125-126 and mapper 3000 and associated text) for tracking methods (E.g. see FIG. 2&3 instrumentation routines 220) currently active in said executing program.”.



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As Per Claim 13, the rejection of claim 1 is incorporated and further Burrows does not explicitly disclose an interpreter device. However, Blandy, in analogous art, teaches “implementing an interpreter device (E.g. see col. 1:33-34 , Java Interpreter, and col. 4:31-33) for ensuring execution of said yield points in said program”. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Blandy into the system of Burrows to implement an interpreter device for ensuring execution of said yield points in said program. The modification would have been obvious because one of ordinary skill in the art would have been motivated to easily translate bytecode instructions on the fly into native machine code and decode and execute a bytecode on any machine.

As Per Claim 15, Burrows discloses:

“a) Inserting yield points at distinguished locations (E.g. see col. 4:21-27) of a program to be executed, each said yield point indicating a potential sampling operation during execution of said program;” (E.g. see FIG. 2 instruction points 210 and associated text).

“b) during program execution, identifying a yield point instance; (E.g. see FIG. 2 instruction points 210 and associated text)”

“e) recording relevant information (E.g. see col. 4:21-27, gathering performance data) for characterizing behavior of said execution environment in response to said sampling.”

Burrows does not explicitly disclose counting a number of identified yield points. However, Blandy, in analogous art, teaches “counting a number of identified yield points (E.g. see FIG.3 count field 304 and associated text, each method has its own count field) in said

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program for characterizing said program behavior”. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Blandy into the system of Burrows, to count a number of identified yield points. The modification would have been obvious because one of ordinary skill in the art would have been motivated to determine the most recently used methods from a plurality of methods in a data processing system.

Burrows does not explicitly disclose threshold and its corresponding action. However, Blandy, in analogous art, teaches “d) comparing said number against a predetermined threshold. (E.g. see FIG. 5 step 508 & 512 and associated text)” and “e) in response to meeting said threshold, performing a sampling operation (E.g. see FIG. 5 step 510 & 514 and associated text, i.e. col. 5:65-66, other actions) of said executing program”. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Blandy into the system of Burrows, implement threshold and its corresponding action. The modification would have been obvious because one of ordinary skill in the art would have been motivated to detect the resource shortage.

As per Claims 16-19, 21-22, and 24, the rejection of claim 15 are incorporated and are rejected under the same reason set forth in connection of the rejection of claims 2-5, 10-11 and 13 respectfully.

As per Claims 26-29, 32-33 and 35-36, the rejection of claim 15 are incorporated and are rejected under the same reason set forth in connection of the rejection of claims 2-5 and 10-13 respectfully.

As Per Claim 31, the rejection of claim 30 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 9.

4. Claims 14 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burrows in view of Alpern et al. "The Jalapeño Virtual Machine", IBM System Journal, Vol 39, No 1, February 2000, hereafter Alpern.

As Per Claim 14, the rejection of claim 1 is incorporated and further Burrows does not disclose method prologue and back edge yield points. However, Alpern teaches "yield points are inserted in one or more program locations including: a method prologue and a loop back edge." (E.g. see Page 222, left hand column, Line2 35-46). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Alpern into the system of Burrows to use method prologue and back edge yield points. The modification would have been obvious because one of ordinary skill in the art would have been motivated to take profile data samples.

As per Claim 23, the rejection of claim 15 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 14.

5. Claims 20 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burrows in view of Blandy, further in view of Holzle al., US Patent No. 5,995,754 (hereinafter Holzle).

As Per Claim 20, the rejection of claims 15 is incorporated and further the combination of Burrows and Blandy disclose "initializing (E.g. see Blandy, FIG. 4 step 402) a counter (E.g. see Blandy, FIG.3 count field 304 and associated text) to said predetermined threshold".

the combination of Burrows and Blandy do not explicitly disclose initializing counter to threshold value and decrementing the counter to zero. However, Holzle teaches "for each identified yield point instance, decrementing said counter until said counter is zero, whereby said sampling operation is arranged such that a fixed percentage of all executed yield points are taken." (E.g. see Col. 8: 19-33, and FIG. 5 and associated text"). The examiner interprets that it has the same result when the counter is incremented from zero to a fixed value as well as when the counter is decremented from a fixed value to zero. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Holzle into the system of the combination of Burrows and Blandy, to use counter and threshold. The modification would have been obvious because one of ordinary skill in the art would have been motivated to save the system resource by reducing sampling operations only when the number of times of counter updated is equal to the threshold value.

As Per Claim 34, the rejection of claims 25 is incorporated and is rejected under the same reason set forth in connection of the rejection of claim 20.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

***Correspondence Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kuo-Liang J Tang whose telephone number is 703-305-4866. The examiner can normally be reached on M-F 8:30 to 5:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q Dam can be reached on 703-305-4552.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9306.

*Kuo-Liang J. Tang*

Software Engineer Patent Examiner



**ANTONY NGUYEN-BA  
PRIMARY EXAMINER**